

Stephen D. Starnes

Biosketch

Professor Starnes received a Bachelor of Science degree in Chemistry from Texas Tech University in 1993 and a Ph.D. from Texas Tech University in Organic Chemistry in 1998. His advisor was Allan D. Headley. He worked two years as a post-doctoral research associate (1998-2000) at The Scripps Research Institute in Julius Rebek Jr.'s group. He joined the Department of Chemistry and Biochemistry at New Mexico State University fall 2000 as a tenure-track assistant professor in Organic Chemistry. He moved to Texas A&M University-Commerce summer 2005 as a tenure track faculty member in Chemistry. Professor Starnes' graduate research involved the synthesis of un-natural amino acids and an examination of their physical properties using spectroscopic and computational techniques. His post-doctoral work was in the field of Molecular Recognition. The work involved the design and synthesis of triphenylene, phthalocyanine and porphyrin based receptors that were used for the recognition of small organic molecules. His current research program centers on the development of synthetic receptors for biologically and environmentally significant anionic and molecular species. He has mentored two Ph.D students, thirteen Masters students and 40 undergraduate research students over the last 12 years.



Professor Starnes has been actively involved with science outreach activities while at TAMU-C. He was project director of Operation Spark, a grant funded by a local company to stimulate an interest in math and sciences in local 6-12 grade students. He also participated in the TAMU-C STEEM project which is centered on science, math, and engineering outreach to students in grades 6-12. He has served as a mentor to 12 NSF-REU students over the last six years, has participated in the ACS-SEED program for several years, and most recently is working to foster an interest in chemistry research and teaching careers in community college students through NSF-TUES and NSF-Noyce grants.

Professor Starnes has received recognition for his teaching efforts. He was awarded the Outstanding Doctoral Teaching Assistant Award at Texas Tech University (1996-1997), the Patricia Christmore Faculty Teaching Award at New Mexico State University (1994) and the Donald C. Roush Excellence in Teaching Award at New Mexico State University (2005). He places great emphasis on quality education both in the classroom and the research lab. He is currently working to implement elements of the NSF sponsored POGIL teaching methods into his classrooms.

Seminar abstract

“Click Porphyrins: Hosts for Chiral and Non-Chiral Guests”

This seminar will present Dr. Starnes' research efforts in porphyrin-related host-guest chemistry including his post-doctoral work on porphyrin-cavitand hybrids, work conducted at New Mexico State University on anion receptors derived from beta-functionalized porphyrins; primarily, the seminar will describe his most recent work at Texas A&M-Commerce, which centers on meso-functionalized porphyrins for the development of anion and amine guests. The synthesis of 15 non-chiral porphyrin hosts and over 25 chiral porphyrin hosts and their recognition properties

with non-chiral and chiral guests that vary in geometry and functionality will be described. For the creation of the chiral hosts, a porphyrin isocyanate was reacted with a variety of commercially available chiral amines and chiral amino alcohols; thus, the chiral hosts presented are practically ‘off the shelf’ receptors that are available in diversity in high yield with minimal synthetic effort. The porphyrin hosts are functionalized at one meso position with guest binding sites that work in tune with the porphyrin metal center to create a binding pocket for guests. Thus, a key aspect of the work centers on the design of the receptors with recognition elements that are pre-positioned to mimic the geometry and functionality of the target guest. The results show that the metal binding interaction and the guest shape-complementarity of the hosts are key components to the porphyrin hosts ability to bind guests selectively. Several hosts display a conformationally-induced organization upon binding to guests.

Evolution of Porphyrin Hosts from Commercially Available Amines

